

egetettace tagtagaggt tgagtgaatt tettgaettg ttteteetat tggtgtatet 60 cttaaaatat taaattcaaa atcaaagtat atattttaca atg aag tct tct ttc Met Lys Ser Ser Phe 1 5 ccc aag ttt gta ttt tct aca ttt gct att ttc cct ttg tct atg att 163 Pro Lys Phe Val Phe Ser Thr Phe Ala Ile Phe Pro Leu Ser Met Ile 10 15 20 gct acc gag aca gtt ttg gat tca agt gcg agt ttc gat ggg aat aaa 211 Ala Thr Glu Thr Val Leu Asp Ser Ser Ala Ser Phe Asp Gly Asn Lys 25 30 35 aat ggt aat ttt tca gtt cgt gag agt cag gaa gat gct gga act acc 259 Asn Gly Asn Phe Ser Val Arg Glu Ser Gln Glu Asp Ala Gly Thr Thr 50 40 45 tac cta ttt aag gga aat gtc act cta gaa aat att cct gga aca ggc Tyr Leu Phe Lys Gly Asn Val Thr Leu Glu Asn Ile Pro Gly Thr Gly 55 60 65 aca gca atc aca aaa agc tgt ttt aac aac act aag ggc gat ttg act 355 Thr Ala Ile Thr Lys Ser Cys Phe Asn Asn Thr Lys Gly Asp Leu Thr 70 75 80

## FIG. 1A

ttc	aca	ggt	aac	ggg	aac	tct	cta	ttg	ttc	caa	acg	gtg	gat	gca	999	403
Phe	Thr	Gly	Asn	Gly	Asn	Ser	Leu	Leu	Phe	Gln	Thr	Val	Asp	Ala	Gly	
				90					95					100		
act	gta	gca	999	gct	gct	gtt	aac	agc	agc	gtg	gta	gat	aaa	tct	acc	451
Thr	Val	Ala	Gly	Ala	Ala	Val	Asn	Ser	Ser	Val	Val	Asp	Lys	Ser	Thr	
			105					110					115			
acg	ttt	ata	999	ttt	tct	tcg	cta	tct	ttt	att	gcg	tct	cct	gga	agt	499
Thr	Phe	Ile	Gly	Phe	Ser	Ser	Leu	Ser	Phe	Ile	Ala	Ser	Pro	Gly	Ser	
		120					125					130				
tcg	ata	act	acc	ggc	aaa	gga	gcc	gtt	agc	tgc	tct	acg	ggt	agc	ttg	547
Ser	Ile	Thr	Thr	Gly	Lys	Gly	Ala	Val	Ser	Cys	Ser	Thr	Gly	Ser	Leu	
	135					140					145					
agt	ttg	aca	aaa	aat	gtc	agt	ttg	ctc	ttc	agc	aaa	aac	ttt	tca	acg	595
Ser	Leu	Thr	Lys	Asn	Val	Ser	Leu	Leu	Phe	Ser	Lys	Asn	Phe	Ser	Thr	
150					155					160					165	
gat	aat	ggc	ggt	gct	atc	acc	gca	aaa	act	ctt	tca	tta	aca	999	act	643
Asp	Asn	Gly	Gly	Ala	Ile	Thr	Ala	Ŀys	Thr	Leu	Ser	Leu	Thr	Gly	Thr	
				170					175					180		
									•							
aca	atg	tca	gct	ctg	ttt	tct	gaa	aat	acc	tcc	tca	aag	aaa	ggc	gga	691
Thr	Met	Ser	Ala	Leu	Phe	Ser	Glu	Asn	Thr	Ser	Ser	Lys	Lys	Gly	Gly	
			185					190					195			

FIG. 1B

gcc	att	cag	act	tcc	gat	gcc	ctt	acc	att	act	gga	aac	caa	999	gaa	739
Ala	Ile	Gln	Thr	Ser	Asp	Ala	Leu	Thr	Ile	Thr	Gly	Asn	Gln	Gly	Glu	
		200					205					210				
gtc	tct	ttt	tct	gac	aat	act	tct	tcg	gat	tct	gga	gct	gca	att	ttt	787
Val	Ser	Phe	Ser	Asp	Asn	Thr	Ser	Ser	Asp	Ser	Gly	Ala	Ala	Ile	Phe	
	215					220					225					
aca	gaa	gcc	tcg	gtg	act	att	tct	aat	aat	gct	aaa	gtt	tcc	ttt	att	835
Thr	Glu	Ala	Ser	Val	Thr	Ile	Ser	Asn	Asn	Ala	Lys	Val	Ser	Phe	Ile	
230					235					240					245	
gac	aat	aag	gtc	aca	gga	gcg	agc	tcc	tca	aca	acg	ggg	gat	atg	tca	883
Asp	Asn	Lys	Val	Thr	Gly	Ala	Ser	Ser	Ser	Thr	Thr	Gly	Asp	Met	Ser	
				250					255					260		
gga	ggt	gct	atc	tgt	gct	tat	aaa	act	agt	aca	gat	act	aag	gtc	acc	931
Gly	Gly	Ala	Ile	Cys	Ala	Tyr	Lys	Thr	Ser	Thr	Asp	Thr	Lys	Val	Thr	
			265					270					275			
ctc	act	gga	aat	cag	atg	tta	ctc	ttc	agc	aac	aat	aca	tcg	aca	aca	979
Leu	Thr	Gly	Asn	Gln	Met	Leu	Leu	Phe	Ser	Asn	Asn	Thr	Ser	Thr	Thr	
		280					285					290				
gcg	gga	gga	gct	atc	tat	gtg	aaa	aag	ctc	gaa	ctg	gct	tcc	gga	gga	1027
Ala	Gly	Gly	Ala	Ile	Tyr	Val	Lys	Lys	Leu	Glu	Leu	Ala	Ser	Gly	Gly	
	295					300					305					

## FIG. 1C

ctt	acc	cta	ttc	agt	aga	aat	agt	gtc	aat	gga	ggt	aca	gct	cct	aaa	1075
Leu	Thr	Leu	Phe	Ser	Arg	Asn	Ser	Val	Asn	Gly	Gly	Thr	Ala	Pro	Lys	
310					315					320					325	
ggt	gga	gcc	ata	gct	atc	gaa	gat	agt	999	gaa	ttg	agt	tta	tcc	gcc	1123
Gly	Gly	Ala	Ile	Ala	Ile	Glu	Asp	Ser	Gly	Glu	Leu	Ser	Leu	Ser	Ala	
				330					335					340		
gat	agt	ggt	gac	att	gtc	ttt	tta	999	aat	aca	gtc	act	tct	act	act	1171
Asp	Ser	Gly	Asp	Ile	Val	Phe	Leu	Gly	Asn	Thr	Val	Thr	Ser	Thr	Thr	
			345					350					355			
cct	999	acg	aat	aga	agt	agt	atc	gac	tta	gga	acg	agt	gca	aag	atg	1219
Pro	Gly	Thr	Asn	Arg	Ser	Ser	Ile	Asp	Leu	Gly	Thr	Ser	Ala	Lys	Met	
		360					365					370				
aca	gct	ttg	cgt	tct	gct	gct	ggt	aga	gcc	atc	tac	ttc	tat	gat	ccc	1267
Thr	Ala	Leu	Arg	Ser	Ala	Ala	Gly	Arg	Ala	Ile	Tyr	Phe	Tyr	Asp	Pro	
	375					380					385					
ata	act	aca	gga	tca	tcc	aca	aca	gtt	aca	gat	gtc	tta	aaa	gtt	aat	1315
Ile	Thr	Thr	Gly	Ser	Ser	Thr	Thr	Val	Thr	Asp	Val	Leu	Lys	Val	Asn	
390					395					400					405	
gag	act	ccg	gca	gat	tct	gca	cta	caa	tat	aca	ggg	aac	atc	atc	ttc	1363
Glu	Thr	Pro	Ala	Asp	Ser	Ala	Leu	Gln	Tyr	Thr	Gly	Asn	Ile	Ile	Phe	
				410					415					420		

FIG. 1D

aca	gga	gaa	aag	tta	tca	gag	aca	gag	gcc	gca	gat	tct	aaa	aat	ctt	1411
Thr	Gly	Glu	Lys	Leu	Ser	Glu	Thr	Glu	Ala	Ala	Asp	Ser	Lys	Asn	Leu	
			425					430					435			
act	tcg	aag	cta	cta	cag	cct	gta	act	ctt	tca	gga	ggt	act	cta	tct	1459
Thr	Ser	Lys	Leu	Leu	Gln	Pro	Val	Thr	Leu	Ser	Gly	Gly	Thr	Leu	Ser	
		440					445					450				
tta	aaa	cat	gga	gtg	act	ctg	cag	act	cag	gca	ttc	act	caa	cag	gca	1507
Leu	Lys	His	Gly	Val	Thr	Leu	Gln	Thr	Gln	Ala	Phe	Thr	Gln	Gln	Ala	
	455					460					465					
gat	tct	cgt	ctc	gaa	atg	gac	gta	gga	act	act	cta	gaa	cct	gct	gat	1555
Asp	Ser	Arg	Leu	Glu	Met	Asp	Val	Gly	Thr	Thr	Leu	Glu	Pro	Ala	Asp	
470					475					480					485	
act	agc	acc	ata	aac	aat	ttg	gtc	att	aac	atc	agt	tct	ata	gac	ggt	1603
Thr	Ser	Thr	Ile	Asn	Asn	Leu	Val	Ile	Asn	Ile	Ser	Ser	Ile	Asp	Gly	
				490					495					500		
gca	aag	aag	gca	aaa	ata	gaa	acc	aaa	gct	acg	tca	aaa	aat	ctg	act	1651
Ala	Lys	Lys	Ala	Lys	Ile	Glu	Thr	Lys	Ala	Thr	Ser	Lys	Asn	Leu	Thr	
			505					510					515			
tta	tct	gga	acc	atc	act	tta	ttg	gac	ccg	acg	ggc	acg	ttt	tat	gaa	1699
Leu	Ser	Gly	Thr	Ile	Thr	Leu	Leu	Asp	Pro	Thr	Gly	Thr	Phe	Tyr	Glu	
		520					525					530				

FIG. 1E

aat	cat	agt	tta	aga	aat	cct	cag	tcc	tac	gac	atc	tta	gag	ctc	aaa	1/4/
Asn	His	Ser	Leu	Arg	Asn	Pro	Gln	Ser	Tyr	Asp	Ile	Leu	Glu	Leu	Lys	
	535					540					545					
gct	tct	gga	act	gta	aca	agc	acc	gca	gtg	act	cca	gat	cct	ata	atg	1795
Ala	Ser	Gly	Thr	Val	Thr	Ser	Thr	Ala	Val	Thr	Pro	Asp	Pro	Ile	Met	
550					555					560					565	
ggt	gag	aaa	ttc	cat	tac	ggc	tat	cag	gga	act	tgg	ggc	cca	att	gtt	1843
Gly	Glu	Lys	Phe	His	Tyr	Gly	Tyr	Gln	Gly	Thr	Trp	Gly	Pro	Ile	Val	
				570					575					580		
tgg	999	aca	ggg	gct	tct	acg	act	gca	acc	ttc	aac	tgg	act	aaa	act	1891
Trp	Gly	Thr	Gly	Ala	Ser	Thr	Thr	Ala	Thr	Phe	Asn	Trp	Thr	Lys	Thr	
			585					590					595			
ggc	tat	att	cct	aat	ccc	gag	cgt	atc	ggc	tct	tta	gtc	cct	aat	agc	1939
Gly	Tyr	Ile	Pro	Asn	Pro	Glu	Arg	Ile	Gly	Ser	Leu	Val	Pro	Asn	Ser	
		600					605					610				
tta	tgg	aat	gca	ttt	ata	gat	att	agc	tct	ctc	cat	tat	ctt	atg	gag	1987
Leu	Trp	Asn	Ala	Phe	Ile	Asp	Ile	Ser	Ser	Leu	His	Tyr	Leu	Met	Glu	
	615					620					625					
act	gca	aac	gaa	ggg	ttg	cag	gga	gac	cgt	gct	ttt	tgg	tgt	gct	gga	2035
Thr	Ala	Asn	Glu	Gly	Leu	Gln	Gly	Asp	Arg	Ala	Phe	Trp	Cys	Ala	Gly	
630					635					640					645	

FIG. 1F

tta	tct	aac	ttc	ttc	cat	aag	gat	agt	aca	aaa	aca	cga	cgc	<b>9</b> 99	ttt	2083
Leu	Ser	Asn	Phe	Phe	His	Lys	Asp	Ser	Thr	Lys	Thr	Arg	Arg	Gly	Phe	
				650					655					660		
cgc	cat	ttg	agt	ggc	ggt	tat	gtc	ata	gga	gga	aac	cta	cat	act	tgt	2131
Arg	His	Leu	Ser	Gly	Gly	Tyr	Val	Ile	Gly	Gly	Asn	Leu	His	Thr	Cys	
			665					670					675			
tca	gat	aag	att	ctt	agt	gct	gca	ttt	tgt	cag	ctc	ttt	gga	aga	gat	2179
Ser	Asp	Lys	Ile	Leu	Ser	Ala	Ala	Phe	Cys	Gln	Leu	Phe	Gly	Arg	Asp	
		680					685					690				
aga	gac	tac	ttt	gta	gct	aag	aat	caa	ggt	aca	gtc	tac	gga	gga	act	2227
Arg	Asp	Tyr	Phe	Val	Ala	Lys	Asn	Gln	Gly	Thr	Val	Tyr	Gly	Gly	Thr	
	695					700					705					
ctc	tat	tac	cag	cac	aac	gaa	acc	tat	atc	tct	ctt	cct	tgc	aaa	cta	2275
Leu	Tyr	Tyr	Gln	His	Asn	Glu	Thr	Tyr	Ile	Ser	Leu	Pro	Cys	Lys	Leu	
710					715					720					725	
cgg	cct	tgt	tcg	ttg	tct	tat	gtt	cct	aca	gag	att	cct	gtt	ctc	ttt	2323
Arg	Pro	Cys	Ser	Leu	Ser	Tyr	Val	Pro	Thr	Glu	Ile	Pro	Val	Leu	Phe	
				730					735					740		
tca	gga	aac	ctt	agc	tac	acc	cat	acg	gat	aac	gat	ctg	aaa	acc	aag	2371
Ser	Gly	Asn	Leu	Ser	Tyr	Thr	His	Thr	Asp	Asn	Asp	Leu	Lys	Thr	Lys	
			745					750					755	-		

## **FIG. 1G**

tat	aca	aca	tat	cct	act	gtt	aaa	gga	agc	tgg	999	aat	gat	agt	ttc	2419
Tyr	Thr	Thr	Tyr	Pro	Thr	Val	Lys	Gly	Ser	${\tt Trp}$	Gly	Asn	Asp	Ser	Phe	
		760					765	•				770				
gct	tta	gaa	ttc	ggt	gga	aga	gct	ccg	att	tgc	tta	gat	gaa	agt	gct	2467
Ala	Leu	Glu	Phe	Gly	Gly	Arg	Ala	Pro	Ile	Cys	Leu	Asp	Glu	Ser	Ala	
	775					780					785					
cta	ttt	gag	cag	tac	atg	ccc	ttc	atg	aaa	ttg	cag	ttt	gtc	tat	gca	2515
Leu	Phe	Glu	Gln	Tyr	Met	Pro	Phe	Met	Lys	Leu	Gln	Phe	Val	Tyr	Ala	
790					795					800					805	
cat	cag	gaa	ggt	ttt	aaa	gaa	cag	gga	aca	gaa	gct	cgt	gaa	ttt	gga	2563
His	Gln	Glu	Gly	Phe	Lys	Glu	Gln	Gly	Thr	Glu	Ala	Arg	Glu	Phe	Gly	
				810					815					820		
agt	agc	cgt	ctt	gtg	aat	ctt	gcc	tta	cct	atc	999	atc	cga	ttt	gat	2611
Ser	Ser	Arg	Leu	Val	Asn	Leu	Ala	Leu	Pro	Ile	Gly	Ile	Arg	Phe	Asp	
			825					830					835			
aag	gaa	tca	gac	tgc	caa	gat	gca	acg	tac	aat	cta	act	ctt	ggt	tat	2659
Lys	Glu	Ser	Asp	Cys	Gln	Asp	Ala	Thr	Tyr	Asn	Leu	Thr	Leu	Gly	Tyr	
		840					845					850				
act	gtg	gat	ctt	gtt	cgt	agt	aac	ccc	gac	tgt	acg	aca	aca	ctg	cga	2707
Thr	Val	Asp	Leu	Val	Arg	Ser	Asn	Pro	Asp	Cys	Thr	Thr	Thr	Leu	Arg	
	855					860					865					

FIG. 1H

att	agc	ggt	gat	tct	tgg	aaa	acc	ttc	ggt	acg	aat	ttg	gca	aga	caa	2755
Ile	Ser	Gly	Asp	Ser	Trp	Lys	Thr	Phe	Gly	Thr	Asn	Leu	Ala	Arg	Gln	
870					875					880					885	
gct	tta	gtc	ctt	cgt	gca	999	aac	cat	ttt	tgc	ttt	aac	tca	aat	ttt	2803
Ala	Leu	Val	Leu	Arg	Ala	Gly	Asn	His	Phe	Cys	Phe	Asn	Ser	Asn	Phe	
				890					895					900		
gaa	gcc	ttt	agc	caa	ttt	tct	ttt	gaa	ttg	cgt	999	tca	tct	cgc	aat	2851
Glu	Ala	Phe	Ser	Gln	Phe	Ser	Phe	Glu	Leu	Arg	Gly	Ser	Ser	Arg	Asn	
			905					910					915			
tac	aat	gta	gac	tta	gga	gca	aaa	tac	caa	ttc	taa	tgc	gttag	gct		2897
Tyr	Asn	Val	Asp	Leu	Gly	Ala	Lys	Tyr	Gln	Phe						
		920					925									
ttgg	gtaaa	aga g	gctco	catac	ca to	gaag	ggaa	aaq	gagct	ttt	aaga	attt	ctt 9	gaagg	gctctt	2957
ttcc	togethtog atthogetht tagtgitting chanageact tic 3000															

## **FIG.** 1I

	1	751	150	1	2251	3000
enzyme						
AccB7I	!					
AccI	1				!!	!l
AccII	·				_!	
AccIII			_!			
AciI		*_!	_!!!	!	**	!
AclNI	1		!			
AclWI			**	!!		_!!!
AcsI	1!!			!	!-	_!!!
AfaI	<u></u>	<u> </u>	!!!_		_!!!	!_!!
AluI	!!	!	_*!!_!!_	_!_!!*_	!!!!!_	.!!_*!_
Alw21I	1	!		!	!!	!
Alw26I	l!	!!	!!!	*	!	
AlwI	1		*	!		!!!
AlwNI		_*	!			
Ama87I	l	<u> </u>		!		
ApaI				!		
ApoI	!!			!	!_	_!!![
Asp700I	!!_					!
AspHI	l	!		!	!!	!!_
AspI			!!			
AspS9I	1			!*		
AsuHPI		!!_	!!	!		!
AvaI				!_		
AvaII	_			!		

FIG. 2A

BamHI	
BanII	!!!!_
BbsI	!
Bbv12I	!!!!
BbvI	*_!!!
BcgIB	<u> </u>
BcgIC	!!
BfaI	!!*
BfmI	!!
Bme18I	<u>                                     </u>
BmyI	!!!!
BpiI	<u> !</u>
BpmI	!
Bpu14I	l!
BpuAI	<u>!</u>
BsaBI	<u> </u>
BsaI	<u> </u>
BsaJI	!! <u></u> !
BsaMI	!!
BsaWI	l
Bsc4I	!*_!!!
BscBI	****
BscCI	!!
Bsel18I	<u>                                     </u>
BselI	
Bse8I	!
BseAI	<u> </u>
BseDI	!!!

FIG. 2B

BseNI	<u> </u>
BseRI	
BsgI	ļ !
Bsh1236I	· · · · · · · · · · · · · · · · · · ·
	1
Bsh1365I	<u> </u>
BsiBI	<u> </u>
BsiCI	!!
BsiHKAI	!!!!!
BsiLI	!!
BsiMI	]
BsiSI	!!
BsiYI	[!*_!
BsiZI	<u> </u>
BslI	! <u> </u>
BsmAI	!!!!!!!!
BsmBI	!!
BsmFI	!!!
BsmI	<u> </u>
Bsp119I	<u> </u>
Bsp1286I	!!!!!!
Bsp13I	<u> </u>
BspEI	!
BspHI	
BspLI	
BspMI	!!
BsrBRI	!!
BsrFI	<u> </u>
BsrI	! !! *

FIG. 2C

BsrSI	***
BssAI	!
BssSI	!
BssT1I	!
Bst1107I	!!
Bst2BI	!!
Bst2UI	!!
Bst71I	*_!!!!
BstBI	!
BstDEI	!!!!*!!!!!_
BstEII	!!
BstHPI	<u> </u>
BstNSI	!!
BstOI	!
BstPI	!!
BstSFI	!!!
BstUI	1
BstX2I	!
BstXI	
BstYI	!!!
BstZ17I	
Bsu6I	!!!!!!!
Cac8I	
CbiI	
Cfr10I	!
Cfr13I	<u> </u>
Csp45I	!
DdeT	· · · · · · · · · · · · · · · · · · ·

DpnI	*!!!!!!
DraI	!!
DraII	!
DrdI	<u>          </u>
DseDI	!!
Eam1104I	!!
EarI	!!!
Eco130I	<u> </u>
Eco24I	!!!!!!!
Eco31I	!
Eco47I	<u> </u>
Eco57I	!!
Eco88I	<u> </u>
Eco91I	<u> </u>
EcoNI	!!!
EcoO65I	!
EcoRI	<u> </u>
EcoRII	!
EcoT14I	!
EcoT22I	!
EcoT38I	!!!!
ErhI	<u> </u>
Esp1396I	<u> </u>
Esp3I	!!
FauI	!!
Fnu4HI	

FIG. 2E

FokI	!
FriOI	!!!
Fsp4HI	*_!
GsuI	!
HaeIII	!!
HapII	!!
HgaI	!
HgiEI	!
HindII	!
HindIII	!
HinfI	!!*_!_*!*!!!!!
HpaI	!
HpaII	!!
HphI	
Hsp92II	
ItaI	<u> *_!!</u>
Kpn2I	!
Ksp632I	!
Kzo9I	!!
LspI	<u> </u>
MaeI	!!*
MaeII	!!
MaeIII	<u>                                     </u>
MamI	<u> </u>
MboI	<u> </u>
MboII	

MfeI	<u>                                     </u>
MflI	<u> </u> !
MnlI	
Mph1103I	
MroI	<u>                                     </u>
MroXI	!!
MseI	_*!_!_!!**!!!!!!
MslI	!
MspA1I	<u>                                     </u>
MspR9I	!!!
MunI	<u>                                     </u>
Mva1269I	!!!
MvnI	!!
MwoI	
NlaIII	<u>                                     </u>
NlaIV	<u> </u>
NsiI	!!
NspBII	!!
NspI	<u> </u>
NspV	!
PalI	!!
PflMI	!
PleI	!!
Ppu10I	!!
Psp124BI	!!!!!!
PspEI	!
PspN4I	!!!!!!!!

FIG. 2G

PstI		
RcaI		!
RsaI	!!!	_!_!_!
SacI	!!	!!_
SapI	!	
Sau96I	!*_	
ScrFI	!!!	
SđuI	!!!	!!!_
SfaNI	!!	!!
SfcI	<u> </u>	!
SfuI	!!	
SpeI	!!	
Sse9I	! ! <u>                             </u>	!!_!!**!
SspI	_!!	·
StyI	!	
TaiI	!_!!	!!
TaqI	!!!!_!_!_!_!	!*
TfiI	!!!!!!!!!	!_!_!!!_!
ThaI		!
TrulI	_*!_!_!**_!!	!!!!!
Tru9I	_*!_!_!!*!!	!!!!!
TscI	!_!	!
TseI	*_!!	!
Tsp45I	<u> !!!-!*!!</u>	
Tsp509I		1!_!_!!**!
TspEI		!!_!_!!**!
TspRI	!!!	!!
Tth111I		
Van91I	!!	
Van91I XbaI		
XbaI	!	
XbaI XcmI	!  !	!!!

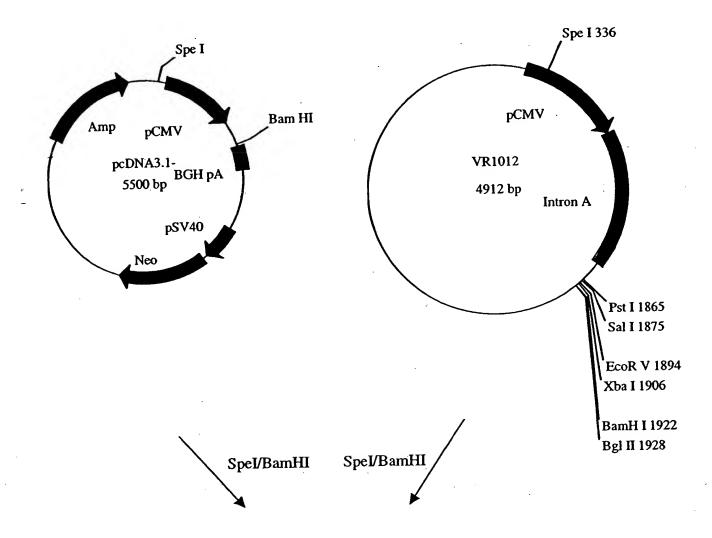


FIG. 3A

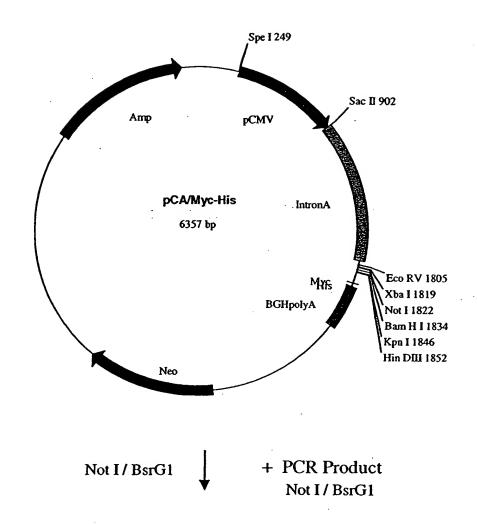


FIG. 3B

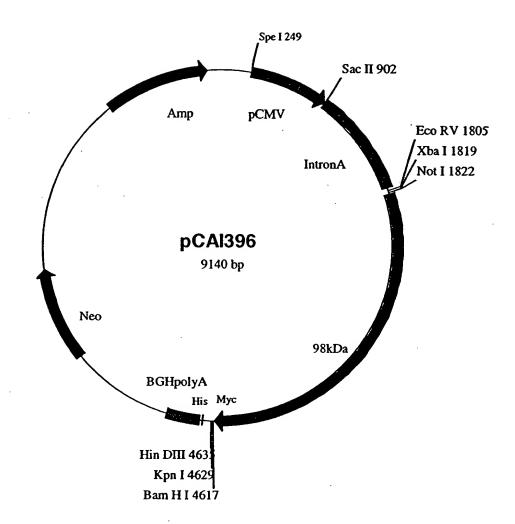


FIG. 3C

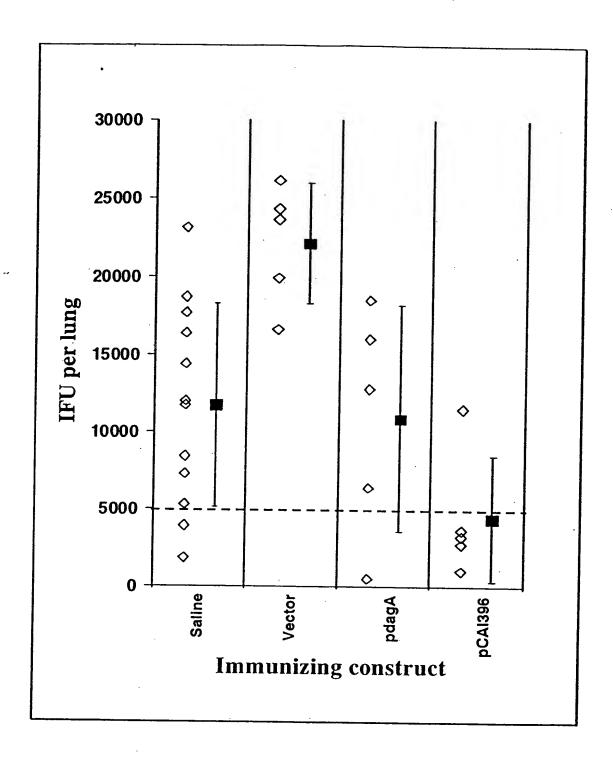


FIG. 4